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1. European Patent Number: EP0258720

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3. European Patent Bulletin Date:
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PATENTS ACT, 1977

IN THE MATTER OF
European Patent No. 0 268 720
(Application No. 86810534.7-2303)
POLYTEX PLASTIC SA

CERTIFICATION BY ANDREAS STEINER

I, Andreas STEINER, Translator of Ammann Patent Attorneys Ltd: Berne, do hereby certify that:

1. I am well acquainted with the English language.

2. That to the best of my knowledge and belief the following is a true translation by me of European Patent no. 0 268 720.

DATED this 26th day of November 1990

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European Patent Application No. 86810534.7-2303/
POLYTEX PLASTIC SA

Translation of the Specification

The present invention refers to a scaffolding board formed from fibre-reinforced plastics material, having an upper portion which is provided at least with longitudinal walls and cemented to a reinforcing portion which is approximately wave-shaped in cross-section. A working platform having the above characteristics is known from DE-A-1 559 034. This working platform comprises at least longitudinal edgings, while it does not appear whether there are transversal edgings as well in order to form a box-shaped portion. The sinusoidal reinforcing portion has the effect that the ridges on which the upper portion rests form only a relatively narrow line which must be widened by pressure. Moreover, this portion does not have any transversal edges. This working platform made of plastics material possibly fulfills the stability requirements for this purpose, but not those which apply for substantially longer and narrower scaffolding boards whose torsional rigidity plays a particular role.

Scaffolding boards made of plastics material are only very rarely found on the market if at all, although they could have great advantages such as e.g. a substantially reduced weight and a greater resistance to the effects of the weather.

By contrast, it is a first object of the present invention to provide a scaffolding board made of plastics material which complies with the stability requirements and the corresponding regulations.

In Technische Rundschau (Technical Review) No. 44-86 of October 10, 1986, p. 23 et seq., a large number

of composite materials for various applications are described. In a certain number of cases, light-hardening single-component systems may be used which are marketed in the form of pre-impregnated, semi-finished products. In the above-mentioned article, which summarizes the prior art, this semi-finished product is used to produce wound parts of a complex shape.

Further, FR-A-2 340 187 discloses a method for moulding a plastics film onto a pattern having deep recesses, wherein the film is preheated and preshaped by means of pressure in order to be subsequently deep-drawn by means of negative pressure on the mould which is provided with openings.

On this technical background, it is another object of the invention to provide a method which allows quick and exact manufacture of the above-mentioned scaffolding boards from a light-hardening, duroplastic composite material, and a further object is to disclose an appropriate device therefor which is improved as compared to the prior art.

These objects are achieved with the scaffolding board, with the method and the device which are described in the claims.

The invention is explained in more detail hereinafter with reference to embodiments of scaffolding boards, with reference to the various operational steps for the manufacture of a scaffolding board, and with reference to a device.

Fig. 1 is a plan view of the device of the invention;

Fig. 2 is a longitudinal sectional view of Fig. 1;

Fig. 3 is a cross-sectional view of Fig. 1 on a larger scale;

Fig. 4 illustrates a modification of Fig. 3;

Fig. 5 shows an enlarged detail of Fig. 2;

Fig. 6 is a schematic view, on an enlarged scale, of the construction of the device according to Fig. 1;

Figs. 7 to 12 illustrate six operational steps for the manufacture of a scaffolding board;

Fig. 13 is a plan view of a scaffolding board according to the invention;

Fig. 14 is a sectional view taken along the line XIV-XIV of Fig. 13;

Fig. 15 is a partial longitudinal sectional view of the first embodiment according to Fig. 13;

Fig. 16 shows a modification of Fig. 15;

Fig. 17 is a partial cross-sectional view of the modification, similar to Fig. 14; and

Fig. 18 illustrates a sealed edge of the scaffolding board on an enlarged scale.

Figs. 1 to 6 illustrate the construction of a lower mould portion 1 which comprises an edge 2 and a mould interior 3. The base 23 of the mould interior may be level, as in Fig. 3, or it may have longitudinal ribs 4 or a grooving 24, as in Fig. 4. As indicated in the sectional views and more especially in Fig. 6, the lower mould portion 1 is formed from a porous material 5. This porous material may be formed, for example, from a mixture of granulated aluminium and resin, where the small granulated aluminium balls 6 may have diameters of from 0.5 mm to 4 mm, for example. In such a case, it has proved to be advantageous to use granules of different sizes and to provide finer granules internally, in the vicinity of the part to be shaped, than externally, as schematically illustrated by three layers in Fig. 5. To produce the lower mould portion, a mixture of granul-

ated aluminium 6 and resin 7, approximately in a ratio of 1.5 - 1 to 0.2 depending on the diameter of the granulated aluminium, is introduced in another mould and heated until the resin layer begins to melt and ties the granulated aluminium together in such a manner that spaces result, as indicated in Fig. 6, to achieve the desired permeability to air. Instead of using granulated aluminium, of course, other granules may also be used or, in special cases, even natural stone which is permeable to air.

The lower mould portion contains two inlet connections: one inlet connection for vacuum 8 and one inlet connection for compressed air 9, see Fig. 1. Both inlet connections extend into an annular conduit 10 which is formed from a metal pipe having apertures 19 directed towards the mould interior, and which is advantageously insulated by a glass-fibre mat 11 which is permeable to air. A circumferential groove 12, which is V-shaped, for example, is provided in the upper surface, and a circumferential press-ring 13 on the frame-like upper mould portion 14 engages in groove 12, see Fig. 7. The lower mould portion 1 is covered with an air-tight casing 15 which envelops the entire lower mould portion, with the exception of the mould interior 3.

The use of the mould is explained hereinafter with reference to the production of a scaffolding board as shown in Figs. 7 to 12 and 13 to 18. In the present case, a light-hardening, pre-impregnated semi-finished product - a prepreg with a glass-fibre roving - is used as a material. The material web 16 is placed upon the lower mould portion 1, and the upper mould portion 14 is closed in order to clamp the web through the press-ring. Subsequently, compressed air is introduced through the

inlet connection 9, so that the web portion arches. Simultaneously, the arched web portion is heated by a heat source 17 which may be a hot-air fan. Care must be taken to ensure that the temperature in the present case does not exceed 80°C. This causes the material to be stretched by about 60%. Subsequently, the vacuum source is connected to the inlet connection 8, see Fig. 10, and the heated and stretched material is deep-drawn through the vacuum. Since the material hardens with light, a source of ultra-violet light 18 is then connected, and the shaped part is thereby hardened. In the present case, and depending on the material, the hardening period lasts for 40 seconds. Subsequently, as shown in Fig. 12, the frame 14 is removed and the shaped part is removed from the mould by the introduction of compressed air.

According to Figs. 14 and 15, the scaffolding board 21 is formed from three box-shaped parts which are glued together or, according to Figs. 16 and 17, from two such parts which, in the mould shown in Figs. 1 to 6, are moulded in the mould interiors 3 and 4. For both modifications, the same upper portion 22 is manufactured in the mould interior 3, the base 23 of the mould having the grooving 24 which corresponds to the upper portion. Each of the transverse sides has an edge 25 serving to accommodate the fittings 26 which are secured by bolts 27. The longitudinal sides of the upper portion are also provided with lateral surfaces 33. After the moulded and hardened part has been removed from the mould, the edges 20 by which the part has been clamped and retained are trimmed.

The lower portion 28 of the board 21 is produced in a lower mould portion similar to the one used for the upper portion, but the surface does not need to be

grooved. The lower portion 28 is provided with longitudinal as well as transversal side surfaces 37 resp. 38. The reinforcing intermediate portion 29 is produced with the mould interior 4 and provided with wave-shaped longitudinal ribs 30 which have a flat configuration and are inclined with respect to the longitudinal axis and are provided with rectilinear, flattened transitional portions which extend in parallel to the upper respectively the lower portion. The reinforcing portion 29 is also provided with longitudinal and transversal side surfaces 34 respectively 35. After the edges 20 of all three portions have been trimmed, these portions are glued together by known methods to produce the scaffolding board 21. Figure 14 shows that the lateral surfaces of the upper and the intermediate portion extend in the same direction, while the lateral surfaces of the base portion extend in the opposite direction in order to produce a closed box.

In the modification shown in Figures 16 and 17, the scaffolding panel 32 is only formed from two portions - the upper portion 22 with the grooving 24 and the reinforcing portion 29 with the longitudinal ribs 30. However, in this modification, the portion 29 with the longitudinal ribs 30 is inverted, i.e. it is connected to the upper portion with upwardly extending lateral surfaces, so that a ribbed surface is produced on the outside, respectively on the underside.

In order to achieve complete protection from moisture, a suitable composition 31 is additionally used to glue and seal the edges, see Fig. 18. Subsequently, the scaffolding board is provided with the fittings - any kind of fittings may be used - possibly by adaptation of the scaffolding board portions. Scaffolding boards which are formed from a compsite material with glass-

fibres, and which have the required stability and breaking resistance as well as the same dimensions of approx. 2,500 x 600 x 50 mm as conventional wooden boards, weigh 14 kg as compared to conventional boards weighing 28 to 30 kg. Not only is such a reduction in weight of enormous advantage to people who have to erect a scaffolding, but the transport costs are also reduced by half, especially in the case of large-scale constructions. Attention should also be drawn to the fact that resistance to the effects of weather is greater than is the case with wood.

Instead of the grooving as illustrated, the surface of the scaffolding board may have any other suitable form, and it is also possible to roughen the surface or to provide it with an anti-slip coating.

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Claims

1. A scaffolding board (21) formed from fibre-reinforced plastics material, having an upper portion (22) which is provided at least with longitudinal walls and cemented to a reinforcing portion (29) whose cross-section is approximately wave-shaped, characterized in that both the upper portion (22) and the reinforcing portion (29) each have a box-shaped configuration, are provided with four side walls (25,33,34,35), and are deep-drawn from a light-hardenable, duroplastic composite material, and in that the wave-shaped reinforcing portion (29) is provided with level longitudinal ribs (30) which are inclined with respect to the longitudinal axis and comprise flattened transitional portions (36) at the top and at the bottom.

2. A scaffolding board according to claim 1, characterized in that the reinforcing portion (29) serves as the lower portion, its lateral edges (34,35) extending in the opposite direction to that of the lateral edges (25,33) of the upper portion (22).

3. A scaffolding board according to claim 1, characterized in that the reinforcing portion (29) serves as an intermediate portion and that the scaffolding board (21) is provided with a lower, box-shaped closure (28), the lateral edges (25,33,35,34) of the upper and intermediate portions extending in the same direction and those (37,38) of the edge trim extending in the opposite direction thereto, and all three portions being cemented together.

4. A scaffolding board according to any one of claims 1 to 3, characterized in that the surface of the board is

provided with means (24) for increasing the resistance to slipping.

5. A scaffolding board according to any one of claims 1 to 4, characterized in that the edges of the board are sealed by means of a composition of matter (31).

6. A method for producing a scaffolding board (21) according to claim 1 or 3 from a light-hardenable, duroplastic composite material, characterized in that a web of plastics material (16) is clamped onto a lower mould portion (1) which is formed from an air-permeable material (5) and provided with different cavities (3,4) for moulding the different portions (22,29,28) of the scaffolding board, compressed air is applied to the lower mould portion, the arched portion of the web is simultaneously heated and expanded, and subsequently a vacuum is applied to the lower mould portion in order to aspirate and deep-draw the web (16), whereupon the shaped scaffolding board portion (22,28,29) is hardened by irradiation from a source of ultra-violet light (18) and is lifted out by means of compressed air after the frame-like upper mould portion (14) has been removed, and the edges (20) of the moulded parts are cut off and the parts are cemented together.

7. A method according to claim 6, characterized in that the edges of the scaffolding board are sealed, and the scaffolding board is subsequently provided with fittings.

8. A device for implementing the method according to claim 6, characterized in that it comprises a lower mould portion (1) having different cavities (3,4) for moulding the different portions (22,28,29) of the scaffolding board and which is formed from a porous material (5; 6,7) and provided with a compressed-air and vacuum

inlet (8,9), the inlets communicating with an annular, air-permeable conduit (10), and the lower mould portion, with the exception of the mould interior (3,4), is surrounded by a casing (15) which is impermeable to air, the device further comprising a heat source (17) and an ultraviolet light source (18).

9. A device according to claim 8, characterized in that the air-permeable material is formed from aluminium granulate (6) which is held together by means of a resin (7).

10. A device according to claim 9, characterized in that the the granulated material comprises granules from 0.5 mm to 4 mm in diameter and, starting from the mould interior (3), granules with increasing diameters are provided.

11. A device according to claims 8 to 10, characterized in that the upper surface of the lower mould portion is provided with a circumferential groove (12), a press-ring (13) in the frame-shaped upper mould portion (14) fitting into groove (12).

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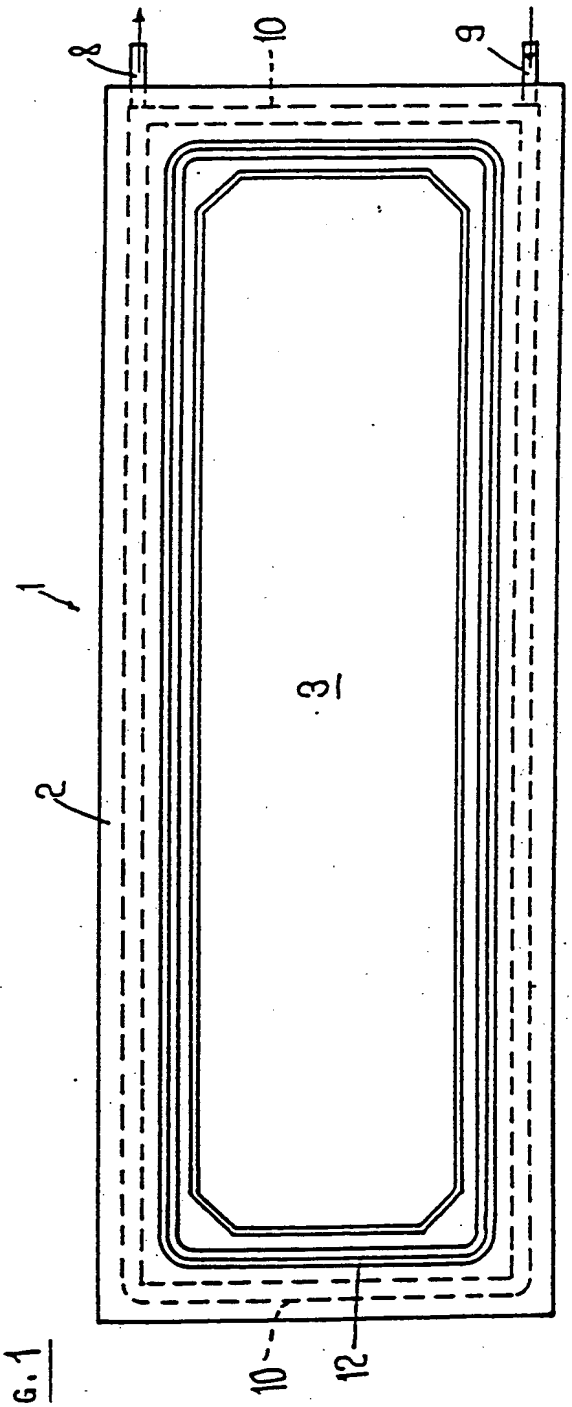

FIG. 1

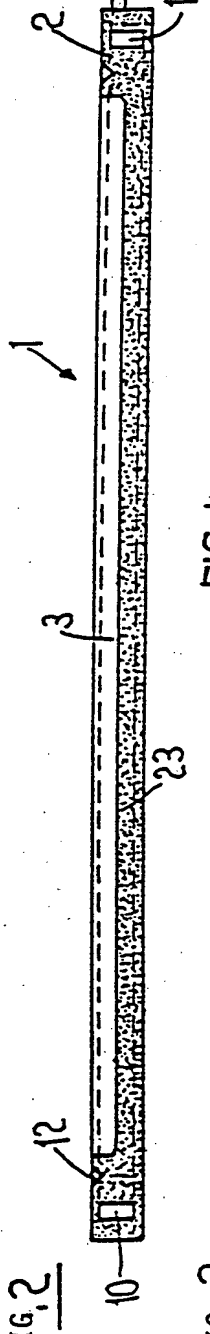

FIG. 2

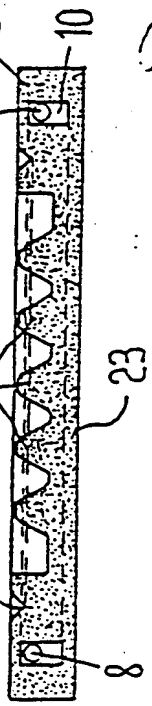

FIG. 4

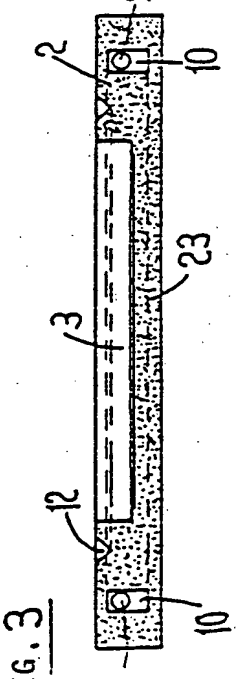

FIG. 3

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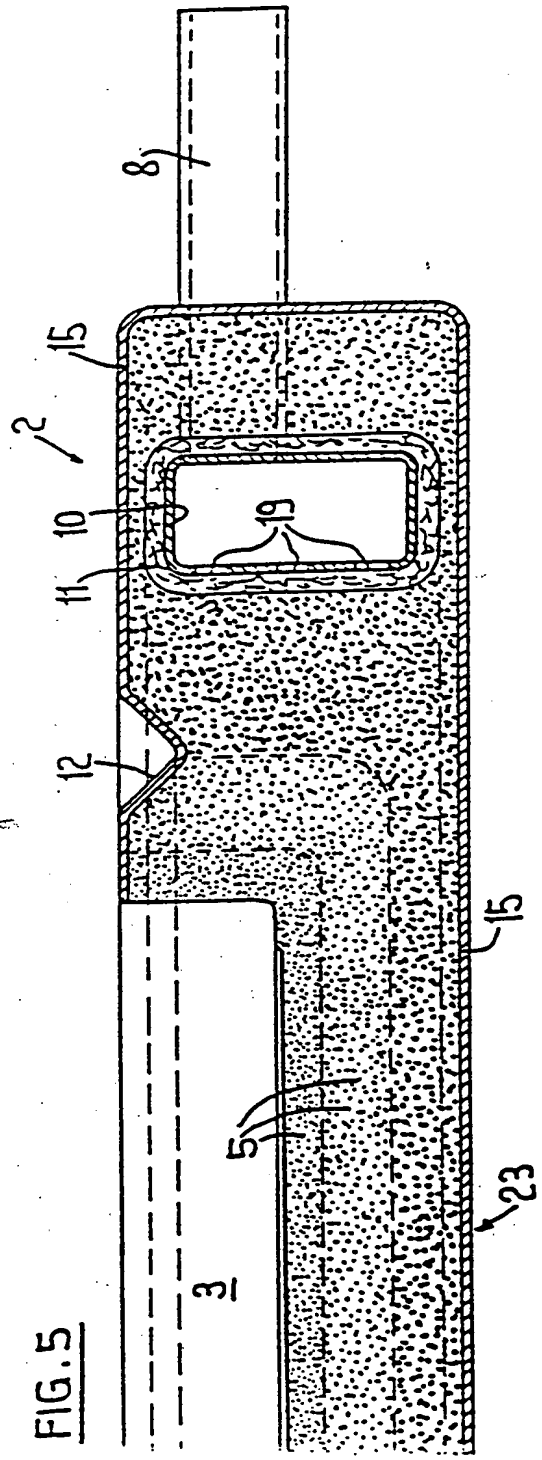

FIG.5

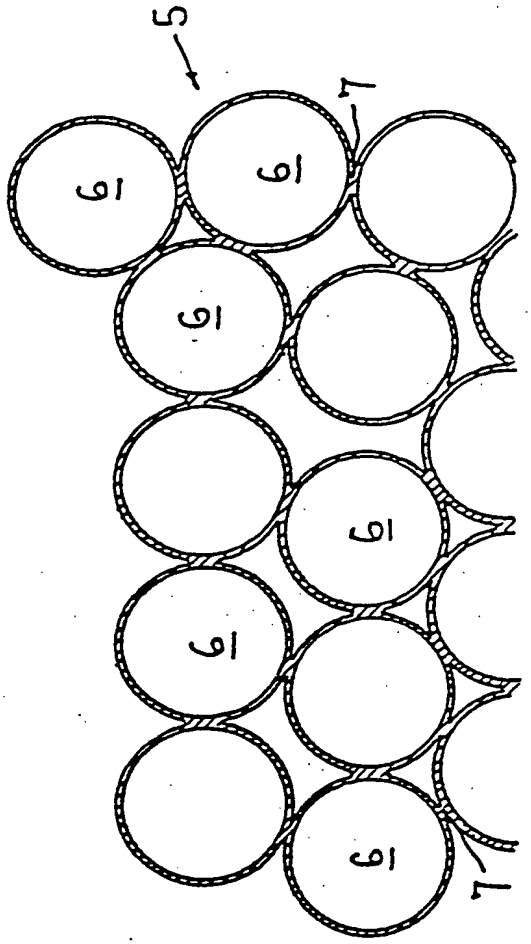

FIG.6

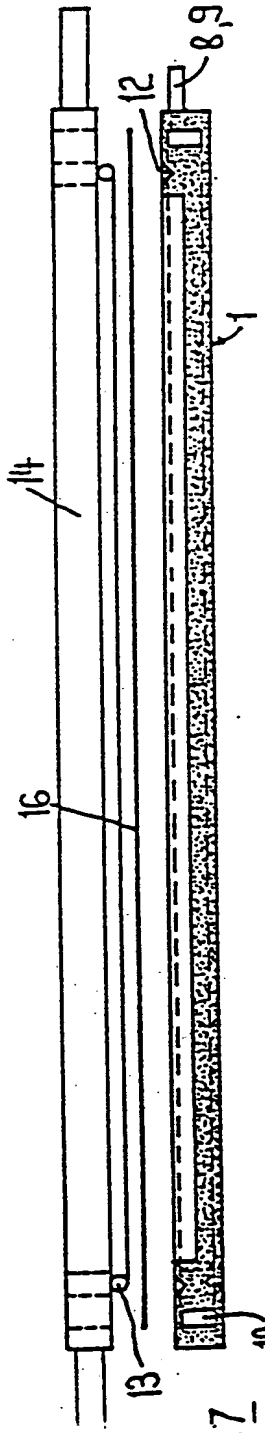

FIG. 7

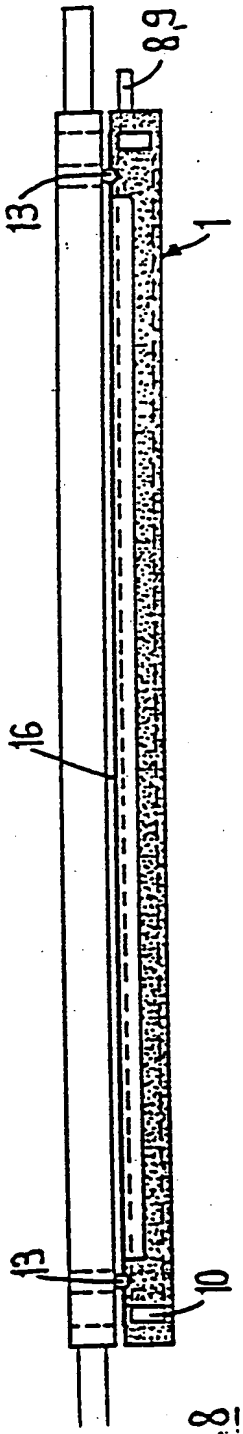

FIG. 8

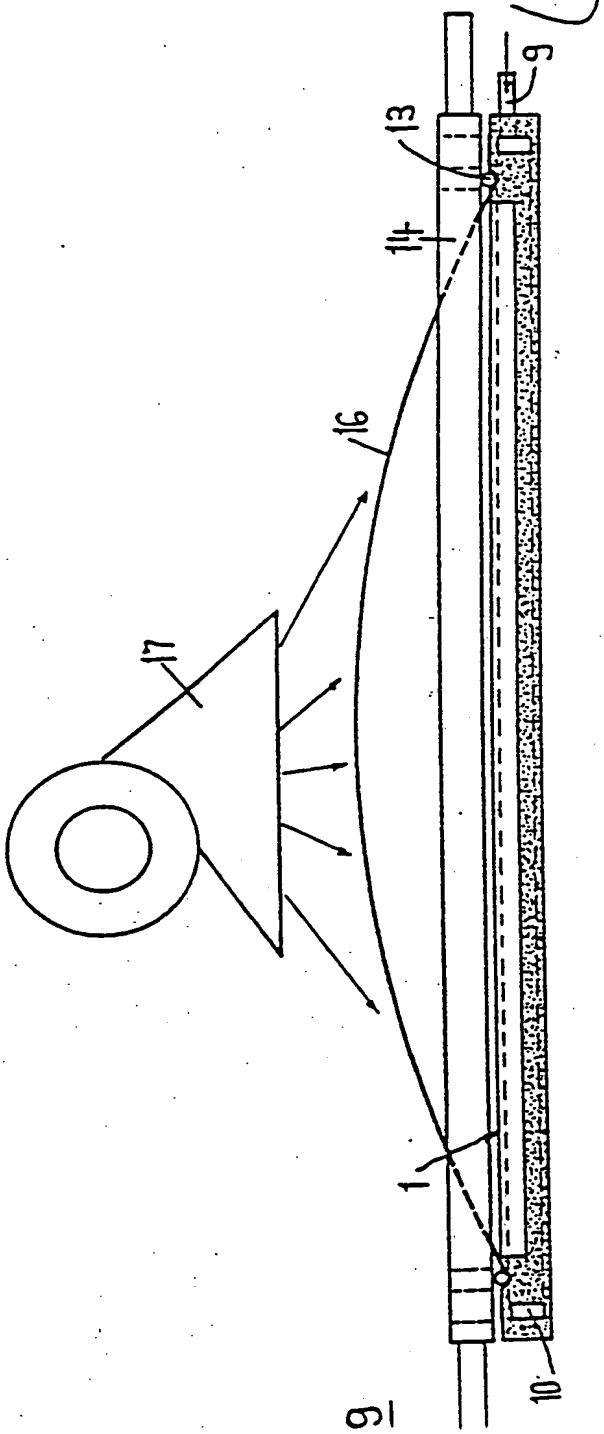

FIG. 9

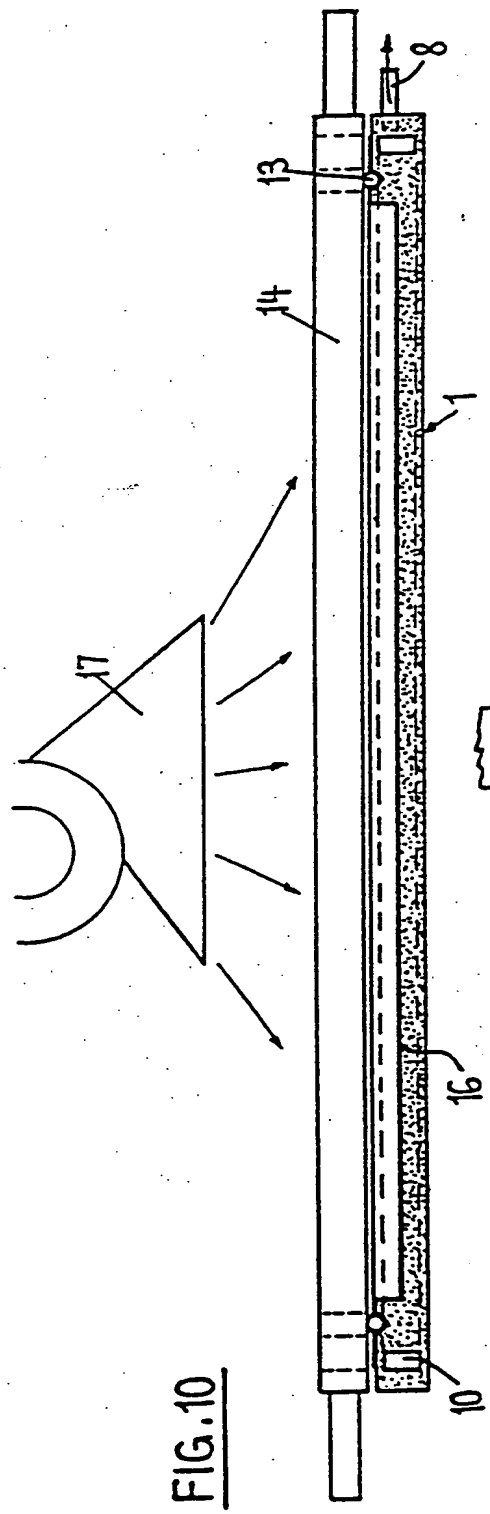

FIG.10

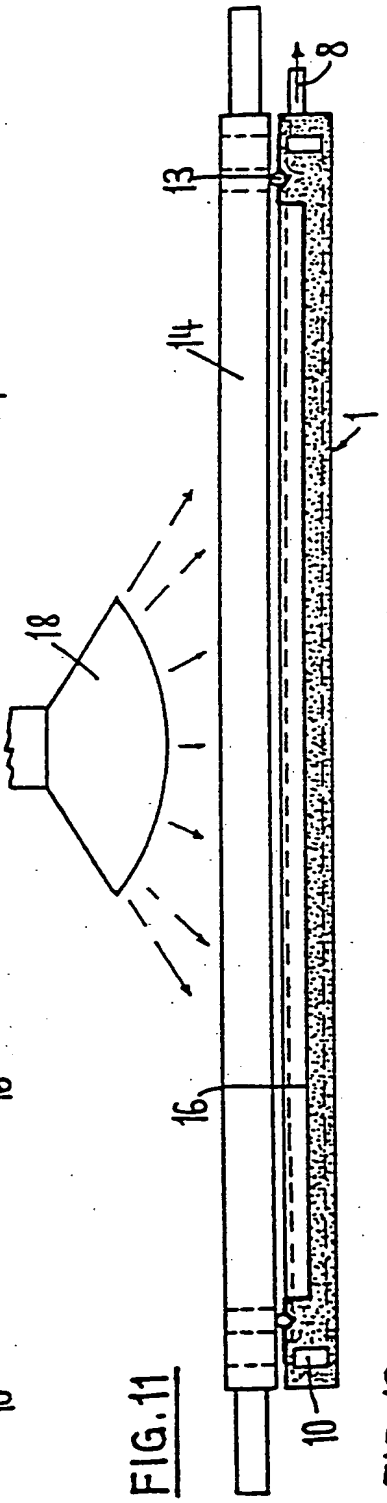

FIG.11

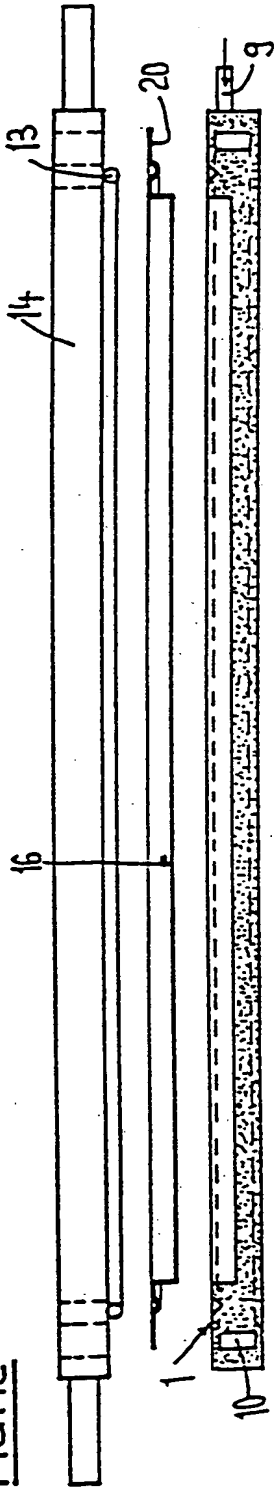

FIG.12

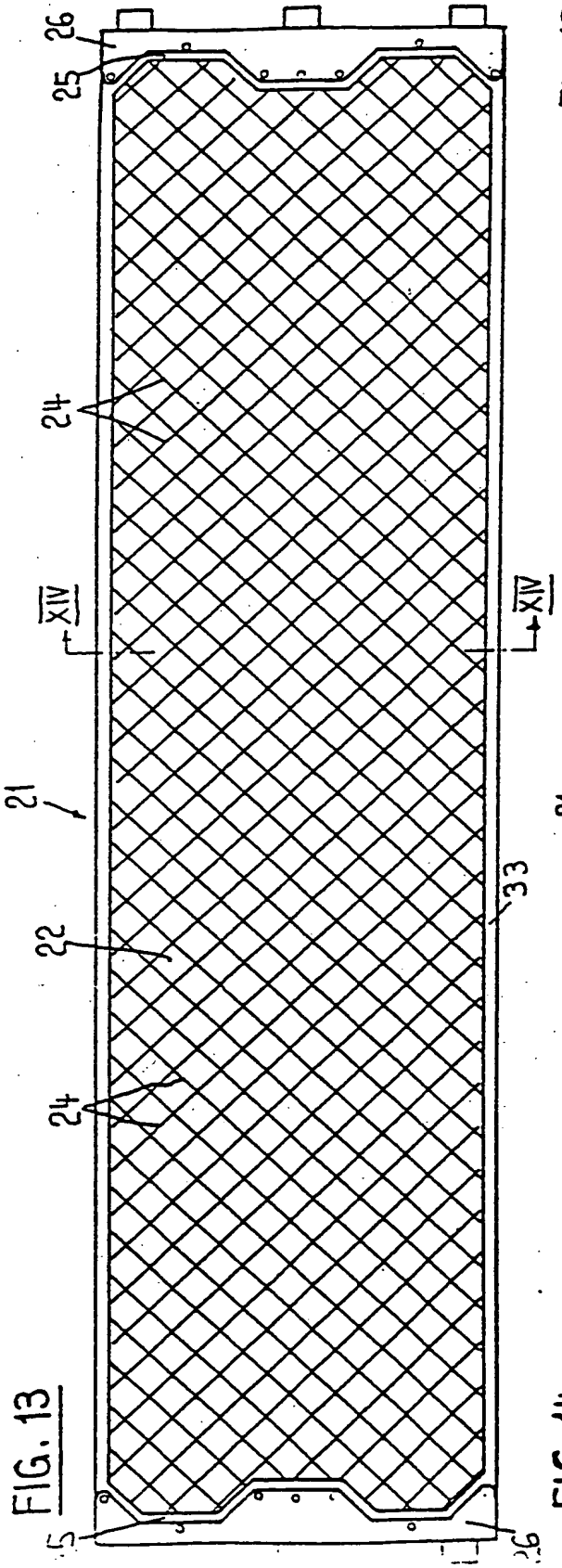

FIG. 13

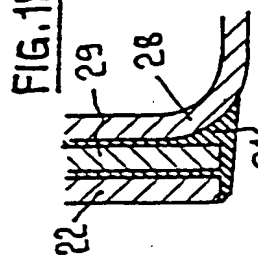

FIG. 18

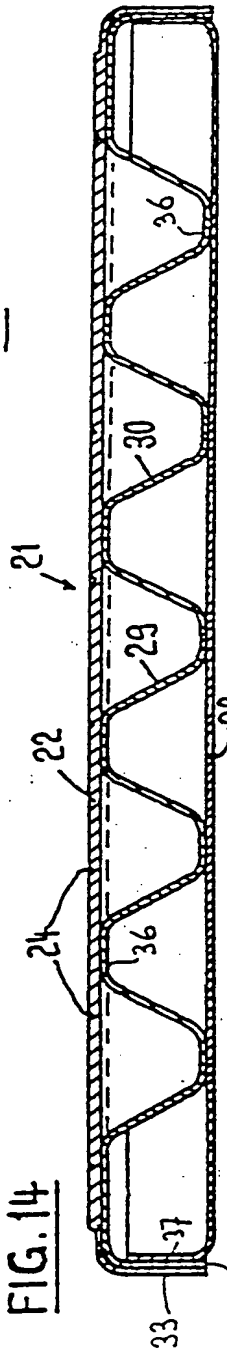

FIG. 14

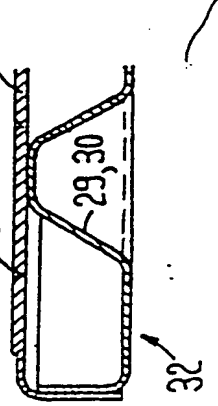

FIG. 17

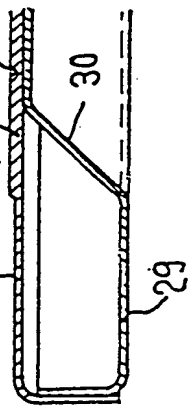

FIG. 16

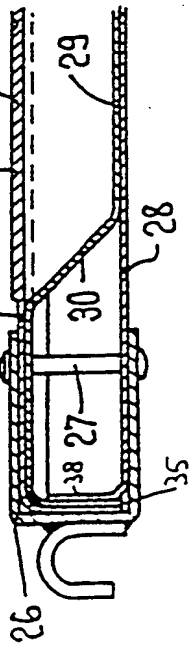

FIG. 15